



Extreme precipitation and aridity in Iberian Peninsula: a new high-resolution susceptibility analysis over 1950–2022

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The goal of this research was to assess the aridity of the Iberian Peninsula (IP) and its susceptibility to precipitation extreme events (PEEs) throughout a long historical period of 1950–2022 and a shorter historical period of 1981–2022, by calculating two aridity indices, eight extreme precipitation indices, and two recently-developed extreme precipitation susceptibility indices (EPSIs), namely a composite index and a principal component analysis-based index. The calculations were based on ERA5-Land reanalysis data, previously bias-corrected with observational data from the Iberia01 dataset as a baseline in a 1971–2015 overlapping period, using a quantile-mapping approach. By performing a trend analysis with the Mann-Kendall non-parametric test for the two study periods, annual and seasonal drying trends over southwestern, central and northeastern regions were detected, as well as an annual wetting trend over the southeast. The assessment of PEEs' contribution to total precipitation presented higher values, of around 24% to 28%, over eastern IP, and showed that it is increasing in several coastal regions during winter, as well as in north-central regions during summer and annually. The most susceptible regions to extreme precipitation events (high to very high susceptibility) are found on the mountains' Atlantic-facing (western IP mountains) or Mediterranean-facing (eastern IP mountains) side and correspond to approximately 50% of the IP territory. The IP's inner regions present low to moderate susceptibility. The results achieved agree with previous studies' results, and give a highly detailed illustration of the PEEs' susceptibility map of the IP and the recent past trends of all IP regions, which is a novelty comparatively to past studies. These data have a variety of applications, e.g., to improve assessment and mitigation of urban flood risks, mitigate water scarcity in the agro-food industry, or prevent crop destruction during extreme precipitation events.

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